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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/525,974 | 02/28/2005 | Takashi Ogura | 033723-009 | 3181 |

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EXAMINER

MARTIN, PAUL C

| ART UNIT | PAPER NUMBER |
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1655

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|------------------------------|--|
| Office Action Summary | Application No. 10/525,974 | Applicant(s) OGURA ET AL. | |
| | Examiner Paul C. Martin | Art Unit 1655 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 28 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>5/04/05, 2/28/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-4 are pending in this application

Claim Objections

Claim 1 is objected to because of the following informalities: Claim 1 in line 6 states that the second step requires cooling the mixture of the first step to between 70 to 270K and maintaining that range in the third step while the fourth step in line 11 requires raising the temperature to between 80 to 270K. If the temperature of the first and second and third steps were 270K then the temperature of the third step would necessarily fall beyond that range. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 1 recites the narrow recitation 80-270K, and the claim also recites "and is higher than the temperature of the third step", which is the narrower statement of the range/limitation.

Claim 1 recites the limitation "the temperature" in Line 11. There is insufficient antecedent basis for this limitation in the claim. It is not clear what temperature is being referred to.

Claims 2-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 2 initially recites the limitation "diffusion onset temperature", and the instant specification notes that the diffusion onset temperatures for at least two substrates are the same temperature in one instance, or differ by a range of 30K in another (Pg. 5, Lines 26-29). The instant specification also lists several more substrates and presumably any of the multitude of representative oxidoreductases can necessarily utilize other substrates not disclosed. Therefore, it would be impossible for the diffusion onset temperature and the claimed ranges to be the same in every embodiment.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Geren *et al.* (1995) in view of Schlichting *et al.* (2000).

Geren *et al.* teaches a method comprising:

Dissolving the oxidoreductase cytochrome-c oxidase, the photoinduced reducing agent Ruthenium (bipyridine), the substrate heme c and the amine-type donor aniline in buffer (Pg. 2467, Column 2, Lines 24-29); and irradiating the mixture with a light in a wavelength region including the absorbing wavelength of the photoinduced reducing agent in order to induce a reaction (Pg. 2467, Column 2, Lines 1-24).

Geren *et al.* does not teach cooling the mixture to 70-270k, or raising the temperature of the frozen mixture to 80-270k and is higher than the temperature at which irradiation was performed.

Geren *et al.* does not teach wherein the mixture prepared in the first step is cooled is cooled to a temperature lower than the diffusion onset temperature at which substrate starts to diffuse in the second step; the frozen mixture prepared in the second step is irradiated with a light at a temperature lower than the diffusion onset temperature in the third step; and the temperature of the frozen mixture of the third step is raised to a temperature higher than the diffusion onset temperature but lower than 270k in the fourth step.

Geren *et al.* does not teach wherein the frozen mixture prepared in the second step is irradiated with a light at a temperature which is 5-20k lower than the diffusion onset temperature in the third step; and the temperature of the frozen mixture of the third step is raised to a temperature between the diffusion onset temperature plus 50k but lower than 270k in the fourth step.

Geren *et al.* does not teach cooling the frozen mixture prepared in the fourth step to a temperature lower than the diffusion onset temperature.

Schlichting *et al.* teaches a method comprising dissolving the oxidoreductase, substrate, and electron donors the reaction mixture is frozen at 88K, irradiating the

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frozen mixture with x-ray light at 96K in the second step, raising the temperature of the frozen mixture to 100K then 293K in the third step (Pg. 1616, Table 1).

Schlichting *et al.* teaches that the mixture of step one is cooled to a temperature lower (88K) than the temperature (diffusion onset, disclosed in the instant specification for oxygen as 170K) at which the substrate starts to diffuse on the second step, irradiating at a temperature lower than the diffusion onset temperature in the third step 96K (Pg. 1616, Table 1) and raising the temperature to a temperature higher than the diffusion onset temperature in the fourth step. While Schlichting does not specifically teach the temperature of the fourth step is lower than 270K, the reference does teach a range 23K beyond 270K.

Schlichting *et al.* teaches cooling the last step frozen mixture to a temperature lower than the diffusion onset temperature (Pg. 1616, Table 1).

It would have been obvious to one of ordinary skill in the art at the time of the instant invention to combine the method of Geren *et al.* with that of Schlichting *et al.* because the method of Geren only provides for the very rapid reaction of oxidoreductase on a substrate through photoreduction of a reducing agent, with amine electron donors. The method does not provide any insight as to the short-lived intermediates and is performed at physiological temperatures. When combined with Schlichting, the methods enable the ordinary artisan to "trap" and examine the volatile

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intermediate structures of oxidoreductase by initiating the reaction and maintaining it at a very slow pace.

The ordinary artisan would have recognized that oxidoreductases operate at or near physiological temperatures and that a brief thaw as in the teachings of Schlichting is necessary for the reaction to proceed. The ordinary artisan would have recognized the importance of irradiating in at a temperature lower than the diffusion onset temperature to initiate priming of the reaction because the artisan would have been interested in every step of the enzyme catalyzed reaction from initial priming of the reaction, raising the temperature to generate intermediates, and then freezing again in order to "trap" and examine those intermediates. Schlichting teaches irradiating at a temperature 74K below the diffusion onset temperature, and it would have been obvious to one of ordinary skill in the art that as long as the mixture remained below 170K it was immaterial whether the temperature was 74K or 5-20K lower. Similarly, the raising of the temperature to a point beyond the diffusion onset to permit the reaction to move forward would have been obvious to one of skill in the art, and the fact that buffer and not water was used in the method of Schlichting required the raising of the temperature to a point beyond the freezing point of water or 273K. Variation of the experimental temperature ranges would have been well within the experience of the ordinary artisan in order to obtain the best possible results and data. The ordinary artisan would have had a reasonable expectation of success based on the success of the individual methods of Geren and Schlichting.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole is *prima facie* obvious to one with ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

No Claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul C. Martin whose telephone number is 571-272-3348. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terry McKelvey can be reached on 571-272-0775. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Paul Martin
Examiner
Art Unit 1655

02/09/06

PATRICIA LEITH
PRIMARY EXAMINER
